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Fig Growing in the South Atlantic and Gulf States

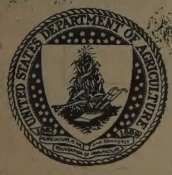

FIG GROWING in the South Atlantic and Gulf States is peculiarly a home enterprise, supplying the family with a fruit that is used in many ways, though in the Gulf coast region of Texas many orchards of considerable size have been developed within the last 12 or 15 years.

Orchards planted east of the Mississippi River, with few exceptions, have proved disappointing, while trees growing about buildings and in yards in the same localities have been habitually productive and long lived.

Fig trees thrive on well-drained, reasonably fertile soil, containing plenty of humus and well supplied with moisture. They also require care in tillage, to avoid injury to the fine fibrous roots which are characteristic of fig trees. East of the Mississippi River these conditions usually are better met about the homes than in orchards.

This bulletin describes the varieties of figs most suitable for the South Atlantic and Gulf States, tells how to grow them and protect them from diseases and insects, and suggests methods of making them into desirable products for the table.

Contribution from the Bureau of Plant Industry
WM. A. TAYLOR, Chief
Washington, D. C. March, 1919

FIG GROWING IN THE SOUTH ATLANTIC AND GULF STATES.

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With contributions by others.

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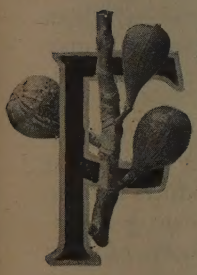

EXTENT OF FIG GROWING IN THE SOUTH.

FIG GROWING IN THE SOUTH has aroused increased interest during the last two or three years, chiefly, perhaps, because of the establishment of girls' canning clubs at many points in the region where figs are widely grown.

Number of trees.—Aside from California, the only States in which fig growing is of any real importance are the South Atlantic group, from Virginia southward, and those which border the Gulf of Mexico. In 1910 California had 269,000 fig trees of bearing age, but this number has increased greatly in the past decade. Virginia in 1910 had 10,136 bearing trees, North Carolina 21,054, South Carolina 24,807, Georgia 49,424, Florida 12,784, Alabama 52,731, Mississippi 65,397, Louisiana 71,464, and Texas 230,171. No other State had as many as 5,000. These figures are the latest available and are indicative of the present conditions, as the fig-growing territory in the South Atlantic and Gulf States has not increased materially since the 1910 census was taken nor has there been any important increase in the rate of planting in these States except in Texas.

South Atlantic States.—In the South Atlantic and Gulf States fig trees are not uniformly distributed. In Virginia nearly all the trees reported are in the counties in the extreme southeastern part of the State, south of Northumberland County and adjacent to the waters of Chesapeake Bay and the lower portions of the several large streams which empty into it.

In North Carolina and South Carolina there are a few hundred trees in nearly every county in the Coastal Plain and Piedmont regions. In Georgia the distribution is fairly general throughout most of the State except the northern sections, where the altitude is relatively high. In Florida a very large percentage of the trees is in the northern part of the State.

Gulf States.—While figs are grown more or less throughout Alabama and Mississippi, in the former State about 88 per cent and in the latter about 85 per cent of the total number of bearing trees reported in 1910 were in the counties in the southern half of the State.

The distribution in Louisiana is more uniform than in any other State, though a large proportion of the total number of trees occurs in a few counties.

In Texas fig trees are chiefly in the eastern quarter of the State. The principal interests are located in the first two or three tiers of counties back from the Gulf coast and extending as far south as Victoria, though some attention has been given to fig growing in the extreme southern part of the State. Many new orchards have been planted in this State since the last census was taken, though it may be questioned whether there are as many trees in good fruiting condition at the present time as there were in 1910.

Distribution limited by winter injury.—Fig growing is confined primarily to regions where the winters are comparatively mild. Fig trees are injured or even killed to the ground by temperatures that do not affect most other fruits of the Temperate Zone when in a dormant condition. Even in sections where the fig has become of some importance, as well as in other parts of the South, winter injury, especially to young trees, is not uncommon. As the trees grow older they become less subject to winter injury. It is commonly believed that after a tree has reached the age of 3 or 4 years it withstands temperatures which previously would have caused heavy killing back of the growth.

Orchards versus home trees.—A large number of fruit trees in a State or region does not necessarily signify an industry of commercial proportions. A few thousand fruit trees growing in comparatively large orchards may make a community industry of considerable local importance, whereas a much larger number of trees widely distributed, a few in a place, in gardens, dooryards, or about buildings,

would represent little from a commercial standpoint. This is especially true of the fig east of the Mississippi River. At a few points in Louisiana, orchards of some commercial importance occur, and in a section of the Gulf coast region of Texas, previously mentioned, a commercial industry has been developed which represents an investment of many thousands of dollars and involves a large acreage. Figure 1 shows a row of fig trees in a fairly typical orchard in the Gulf coast region of Texas.

East of the Mississippi River the fig is not grown on a commercial basis, with some minor exceptions. At some widely separated points orchards of a few hundred trees occur, while one orchard of considerable acreage has completed its fifth season's growth.[1] Sev-

FIG. 1.—A view in a typical Magnolia fig orchard in the Gulf coast region of Texas as it appears in late summer. The trees have been planted eight or nine years, but were killed back to the ground by a freeze which followed a long period of unseasonably warm weather in the winter. The tops are about 5 years old.

eral large promotion enterprises in fig-orchard development are operating in different places, but their ultimate effect upon the development of a substantial fig industry in this region is uncertain.

On the other hand, figs may be seen growing almost everywhere in the fig belt east of the Mississippi River, but in most cases only about buildings or in dooryards and gardens, where a few well-established trees furnish fruit in abundance for home needs and often some to spare. Figures 2, 3, 4, and 5 show plantings of fig trees typical of most of those found east of the Mississippi River.

Many fig orchards of considerable size have been planted in the Coastal Plain and Gulf regions east of the Mississippi River, but

[1] This orchard was grubbed up, following its fifth season, because of very serious injury from low temperatures during the two preceding winters.

usually they have failed entirely. The trees would grow well for perhaps two or three years after they were planted, then begin to show signs of weakness and lack of thrift, and before the orchard had produced fruit in important quantities they would be dead or dying.

This experience has followed so regularly the planting of figs in orchards that many persons have been convinced that the trees can not be made to thrive when planted in orchards like other tree fruits.

FIG. 2.—This is a Celeste fig tree about 18 years old in southern Louisiana as it appears in midsummer. Most of the fig trees in Louisiana and eastward are growing near buildings, in dooryards, or in gardens, and the fruit is used chiefly for the family's own needs. Girls' canning clubs also preserve large quantities of figs from such trees.

SOILS FOR FIG TREES.

Fig trees will grow on a very wide range of soil types, provided the soils are (1) well drained, (2) well supplied with moisture, and (3) reasonably fertile. A fairly high degree of fertility is probably more essential than is commonly supposed.

The importance of soil conditions in growing figs is not fully appreciated. Many of the light sandy soils in which figs have been

widely planted are low in fertility and often lacking in humus. They also suffer badly at times from drought. Many of the fig orchards which have failed in the past have been planted on such soils.

On silt and alluvial soils, which, while well drained, are usually well supplied with moisture and are widely recognized for their fertility, fig trees are characterized by strong growth and dark, luxuriant foliage.

Fig trees generally grow well also on the heavier types of soil in the Gulf coast region of Texas, though these soils are not always as well drained as some of the lighter soils in other parts of the fig belt.

The several types of soil of importance in the present connection

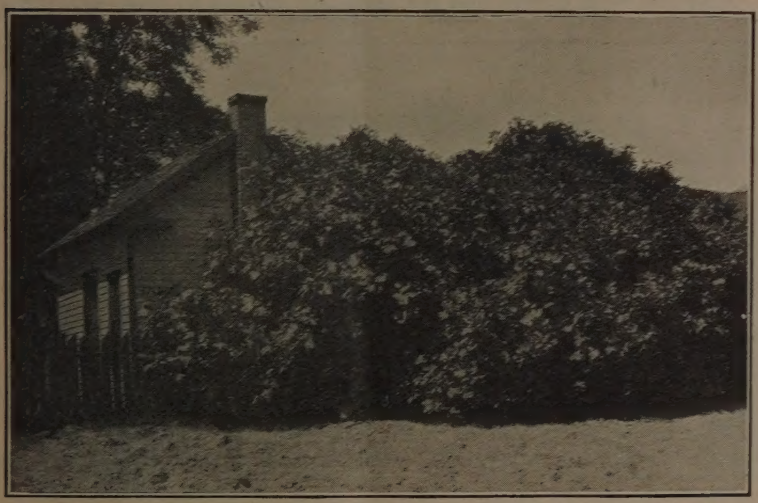

FIG. 3.—Fig bushes in late summer in a garden in southeastern Alabama. This arrangement is fairly typical of the manner in which most fig trees are grown east of the Mississippi River. Contrast this with figure 2, which shows a fig in tree form rather than in bush form.

and the influence of their characteristics upon fig growing may be grouped as follows:

(1) **Light sandy soils**, which commonly lack (*a*) fertility, (*b*) humus, and (*c*) moisture. Because of the lack of humus and moisture, the temperature in the surface soil often becomes extremely high in summer, especially where it is not covered with vegetation. Moreover, these conditions are extremely favorable for the nematode, a parasite to be considered later. On such soils as these many of the failures of figs have occurred.

(2) **Light sandy soils**, such as those described in the above paragraph (1), but located differently, as, for instance, in gardens where the soils have been made more fertile and have received more humus, and, chiefly because of the humus, are less subject to

drought and probably do not become as hot as where these conditions do not obtain; also in locations near buildings where, because of the shade afforded and the increased humus and moisture supply in comparison with an open field, as well as for other reasons, the adverse conditions mentioned in the previous paragraph (1) are much less extreme. A large proportion of the fig trees east of the Mississippi River are growing under such soil conditions as these.

(3) **Silt and alluvial soils,** which commonly occur along the larger streams. In contrast to those specified in the first paragraph (1), these soils are (*a*) fairly fertile, (*b*) well supplied with humus, (*c*) not seriously subject to drought (partly because of being well supplied with humus), and (*d*) doubtless subject to less intense temperature of the surface soil (because of being well supplied with humus and not seriously subject to drought). Fig

FIG. 4.—Celeste fig trees about 12 years old, in midsummer. They are growing in a rich alluvial soil at Alexandria, La., where they have developed rather unusual size.

trees on such soils usually develop dark, luxuriant foliage and make a good, strong growth.

(4) The more **clayey types** that occur in the Gulf coast region of Texas. These soils, though not as well drained as a rule as the other types mentioned, possess some good qualities. In comparison with those specified in the first paragraph (1) they are (*a*) fairly fertile, (*b*) supplied with a higher content of humus, (*c*) less seriously subject to drought, and (*d*) less favorable to the nematode. Moreover, they are known to contain considerable lime, which is very largely lacking in most of the other types under consideration. Growers occasionally remark that fig trees particularly require lime in order to thrive. The importance of lime may be greater than is commonly realized. Most of the fig orchards in Texas are on these heavier soils, while in Louisiana they are as a rule either on comparatively heavy soils or on silt and alluvial types.

PROPAGATION OF FIG TREES.

Fig trees usually are propagated from cuttings. This method is so simple and is used so generally that no special consideration of other methods is needed here.

Cuttings are made during the dormant period from well-matured wood of the preceding season's growth. The long, slender, sappy shoots that sometimes sprout from the ground should not be used. The center of the branches used for cuttings is occupied by a large pith, except at the nodes, or points where the leaf stems are attached. Here the branch is solid throughout, and it is from this area only that roots put forth.

FIG. 5.—The trees in figure 4 are here seen from a different direction. The relation of their position to a stable and wagon shed is also shown. While the shading of the roots by buildings is frequently an advantage, the fertility of the alluvial soil in which they are growing probably account for the large size of these trees.

Therefore, in making cuttings the lower ends should be severed just below the nodes. Otherwise, any portion of a branch below a node which contains the pith is in effect dead wood and likely to cause trouble sooner or later from decay. For a similar reason the top of a cutting should be severed just above a bud. If a stub remains above the topmost bud it dies and is likely to decay. While these details as to where the cuts are made in severing a cutting from a branch are not always carefully observed, the best practice requires it.

Ordinarily, cuttings are made about 8 or 10 inches long, but the length is governed largely by the vigor of growth and the distance between the nodes or buds, the latter being to some extent a matter

of variety. The cuttings may be made in the fall or early winter or in the spring. If made in the fall they are packed in damp moss, moist sand, or otherwise kept moist and cool so that they will remain dormant until the weather is suitable for planting in late winter or early spring. If made upon the approach of spring, they are planted in nursery rows at once. The former practice, which provides for the callusing of the cuttings, is preferred by some propagators, as they believe it gives rather better results.

FIG. 6.—Fig trees in a Florida nursery. The trees are here shown as they appeared in the middle of September. They were placed in the nursery as cuttings the preceding spring and will be ready for permanent planting in the late autumn. The variety is Turkey (*Brown Turkey*).

In planting the cuttings in the nursery, furrows 6 or 8 inches in depth are opened, in which the cuttings are placed in a vertical position 8 or 10 inches apart in the row. The depth at which the cuttings are planted should be governed by their length. One bud should remain just above or even with the surface of the ground. The soil must be packed very firmly about the cuttings.

Under favorable conditions, the cuttings in one season will root and develop into trees suitable for permanent planting. Figure 6 shows a block of fig trees in a Florida nursery in September which were planted the preceding spring.

Fig trees sometimes are propagated by layers, and they may be grafted or budded.

SITES FOR FIG TREES.

The "site" is the exact piece of land on which the trees are planted. Aside from the soil, which has been discussed, little need be said, since in so large a part of the fig belt the plantings occur

FIG. 7.—Fig trees that have made one season's growth in the nursery from cuttings. They are of the right age to plant. In this illustration *A* is a heavily branched tree of the Celeste variety; *B*, Magnolia trees cut back for planting; *C*, Brunswick trees, showing two unpruned and one cut back for planting.

where buildings are located or where the ground is very level, giving little opportunity for choice as to site. However, in some limited sections where there is considerable variation in topography it has been observed that trees planted on northern slopes start into growth later in the spring than those on southern slopes and therefore may escape injury from freezing temperatures when those on southern slopes suffer severely.

PLANTING THE TREES.

Plant strong trees.—Typical fig trees that have made one season's growth in the nursery from cuttings and are in good condition for permanent planting are shown in figure 7. Where the cuttings are planted in the nursery with only one bud above the ground, the growth the first season is usually a straight unbranched stem, as is shown by trees *B* and *C* in figures 7, but in some cases a tree may branch in the manner shown by tree *A* in figure 7.

FIG. 8.—This fig tree is here seen in the middle of its first season's growth after being set out. It was headed about 3 feet high and was a straight, unbranched stalk when planted. It stands near Norfolk, Va.

Very strong root systems with many small fibrous roots, such as have been developed by the trees shown in figure 7, are typical of well-rooted trees from the nursery. For the proper planting of such trees the soil should be deeply plowed and very thoroughly prepared. Recently broken sod land can not ordinarily be put into as good condition for tree planting as that which has been turned long enough for the sod to have become well rotted.

The holes in which the trees are set should be broad enough to receive the roots without bending from their normal positions, though the long straggling roots may be cut off to make them correspond in length with the main portion of the root system.

Bushes or trees?—At the time of planting the grower should decide whether he prefers to have fig trees or bushes. In the former there is a single stem, as shown in figures 2 and 8. In the bush form there are several stems or branches coming from the ground. Growers differ in their opinions as to which of these forms is preferable. Certain advantages are claimed for each.

If the tree or single-stem form is decided upon, the holes in which the trees are planted should be of such depth that when filled the trees will stand an inch or two deeper than they were in the nursery.

If the bush form is preferred, the trees may be planted somewhat deeper than where the tree form is desired, since the deeper planting will tend to induce branching from below the surface.

In putting a tree into the ground, finely pulverized soil must be worked in among the roots very completely and be packed firmly as the holes are filled.

Head back when planting.—At the time of planting, the trees should be headed back, as shown by the tree at *B* and one of those at *C* in figure 7. The exact height at which they are healed varies with the ideals of different growers, but from 12 inches to 3 feet above the surface is usually satisfactory. A tree headed about 3 feet high when planted is shown in figure 8 as it appeared in July of its first season's growth after being permanently planted. A heavily branched tree, like that shown at *A* in figure 7, should be headed back considerably. If the grower wishes a tree form, the main stem should be cut back to the desired height, the lower branches removed, and those branches that are to remain should be cut back enough to make them of uniform length. If a bush form is desired, the lower limbs need not be removed. Again, if the bush form is selected, the trees may be headed somewhat lower than is necessary for the tree form. Very low heading will tend to induce branching from below the ground and the development of sprouts from the roots. In fact, very many figs throughout the regions covered by this bulletin that were planted as trees have become bushes as a result of being frozen back to the ground, the numerous sprouts that came up later being left to devolop.

Plant during dormant season.—The season for planting figs has a rather wide range. The winter climate throughout most of the fig belt is comparatively mild, and the soil may be worked much of the time during the entire winter. Fig trees, therefore, may be planted either in the late autumn, after they become perfectly dormant, or before growth starts in the spring, the period extending from December to early April. Many are planted during February and March; that is, after the colder winter weather is past.

Distances for planting.—The distance apart at which fig trees are planted varies greatly. The more common distances are 10 by 10, 16 by 16, 15 by 20, and 20 by 20 feet. In the Texas orchards trees are rarely planted closer than 16 feet or farther apart than 20 feet each way. If planted where the soil is poor or in a section where the winter temperatures may be expected to kill back the limbs considerably every few years, thus preventing the trees or bushes from reaching a large size, the shorter distances may be satisfactory; but where the soil and climate are favorable to a large growth, the greater distances will not provide more space than is needed. Some growers

advocate planting 22 or even 25 feet apart each way where a strong and uninterrupted growth is expected.

In one case in southern Alabama, on sandy soil made fairly fertile with humus and fertilizers, it was found that after two seasons' growth the roots of Celeste trees planted 16 feet apart each way overlapped considerably in the center of the space between the trees. This suggests that the roots may crowd seriously before the tops do. Moreover, the manner in which the trees are to be pruned should be considered in spacing them. If the tree or single-stem form of growth is to be developed, more space relatively will be needed than where the bush form is strictly followed. The form adopted may be determined by the variety or climate or, to some extent, by personal preference.

MAINTAINING THE FERTILITY OF THE SOIL.

TILLAGE.

Fig tree requirements.—The following requirements for successful fig growing are very closely related to tillage practices:

(1) Fig trees do not compete successfully with weeds and other kinds of vegetation. Where this appears not to be true, soil conditions probably are particularly favorable for the growth of the fig.

While the fig develops large roots it also has a remarkably extensive system of fine fibrous roots. The great mass of feeding roots do not penetrate the soil deeply, but are rather near the surface, as one may readily ascertain by an examination of the soil under a tree.

(3) Because of this shallow-rooting habit, deep tillage destroys a great many roots. It is believed that injury to the roots by too deep tillage, particularly during the growing season, has been a contributing cause in many instances to the failure of figs to do well when attempts have been made to grow them under orchard conditions. The light sandy soils that predominate in the sections where such failures have been most conspicuous are conducive to a deep penetration of the usual kinds of tillage implements.

(4) Fig trees require a good supply of moisture. The results that may follow even a comparatively small reduction of the root system are suggested by a specific instance. In resetting a gatepost that stood near a fig tree a root three-fourths of an inch in diameter was cut off. The tree began to wilt almost immediately, many of the leaves dropped off, and those that remained did not regain a normal condition for several days. Apparently the loss of one root was sufficient to reduce to a serious extent the ability of the tree to take up moisture.

The location of the moisture supply influences in some degree the development of the roots. In one instance, where a fig tree stood near a building and also within 4 or 5 feet of a board walk 40 or 50 feet long, it was found upon removing the boards that one of the roots had grown toward the walk, and after passing the few feet necessary to reach it had turned almost at right angles and then

grown along just under the surface of the ground the entire length of the walk. Where the walk ended the root was nearly half an inch in diameter. Apparently the moisture, temperature, and other conditions of the soil influenced by the shade of the board walk were favorable for root development.

The widespread occurrence of nematodes (sometimes called eelworms) in the soils in the warmer portions of the country requires special mention. The roots of fig trees are especially susceptible to these parasites, which appear to thrive better and to cause more damage in the light sandy types of soil, such as have been used largely for figs, than in the heavier types. The tendency of tillage is to render soil conditions even more favorable for the destructive work of nematodes than they would be otherwise.

Guiding principles in tillage.—The foregoing facts suggest the importance of (1) preventing the growth of weeds and other competing vegetation, (2) very shallow cultivation, (3) using every available means of conserving moisture, and (4) making all soil conditions as favorable as possible for the growth of the trees.

The use of tillage implements which destroy weeds without cutting deeply and which thoroughly stir the surface of the soil is essential.

Texas practice.—The commercial fig orchards in the Gulf coast region of Texas usually receive more or less systematic tillage along the lines suggested. As a rule, the growers in Texas are very careful not to work the soil deep enough to injure the roots, especially during the growing season. Sometimes they plow or cultivate rather deeply in early spring, before growth starts, or during the winter, in the belief that a limited amount of root pruning retards the starting of the buds, thereby avoiding injury from untimely spring frosts. After growth starts only very shallow tillage is permitted, since it is recognized as disastrous to injure the roots during active growth. Shallow cultivation is practiced during the growing season with sufficient frequency to keep down weeds and conserve soil moisture.

Louisiana and eastward.—The system of tillage followed by the Texas growers has been used in a few instances in Louisiana and east of the Mississippi River with results which justify the conviction that when followed judiciously it gives success so far as tillage can do so. In one or two cases winter or early spring plowing is followed by very shallow tillage until some time in May, when cowpeas are sown and allowed to grow through the season. No other tillage is given until the orchard is again plowed the next winter.

Trees beside buildings.—Trees standing beside buildings usually succeed better in some sections than those which grow in the open. Such trees are shown in figure 3. In this and similar cases some of the roots are under the buildings and are therefore shaded and

protected from the high temperature that is reached in the bare soil when fully exposed to the sun.

Cover crops for shade.—If shading the soil is important, then cover crops or green-manure crops may also serve the purpose of giving shade in fig orchards where the soil-moisture conditions admit of their being grown without undue competition for moisture.

Mulching.—Mulching the trees with straw, pine needles, or other material to conserve moisture and shade the ground has been suggested. One grower in Florida who has a small block of fig trees on very sandy soil devoid of all other vegetation observed a very prompt improvement in his trees when they were mulched during their second season's growth, but it seems probable that this practice will afford only temporary advantage, as the roots would doubtless come to the surface of the soil and soon penetrate the lower layers of the mulch, where it remained moist.

Close planting.—Very close planting of the trees with a view to their furnishing shade for one another has also been suggested, but the competition among the trees for soil moisture, as in the use of cover crops, would be likely to defeat the main object of this plan except where moisture is abundantly supplied through irrigation or otherwise.

Study your own case.—The real problem in the tillage of a fig orchard is to determine what is needed in each case to make the soil conditions favorable to the growth of the trees and the development of fruit, and then to adopt the methods of soil management that will most effectively accomplish this.

COVER CROPS.

In some sections of the fig belt the soils evidently lack fertility and moisture-holding capacity. Such soils, especially where the more sandy types predominate, contain as a rule very little humus. It is important to increase materially the quantity of humus in these soils, and in some cases commercial plant foods are probably needed.

The usual way of increasing the humus in the soil is to grow green-manure or cover crops and plow them under. Cowpeas are largely used for this purpose in the South. Many fig growers, because of the susceptibility of cowpeas to nematodes, are reluctant to use this crop in improving the soils in their fig orchards, but the Iron and one or two other varieties of the cowpea are immune to nematodes and may be used without danger. Beggarweed and velvet beans also may be used, as they are not attacked by nematodes.

The use of green-manure crops as a means of adding humus to the soil has its limitations. It is possible that a green-manure crop that must be grown during a period when the fig trees require large quan-

tities of moisture may do more harm, in some seasons at least, by its competition for soil moisture than it does good by adding humus to the soil.

FERTILIZERS.

There is no direct means of determining what plant food should be applied to land for the production of any crop except by experiment; that is, by applying different plant-food elements separately and in different combinations and noting the results. If the results indicate, for instance, that where these elements are used separately there is no apparent response to phosphoric acid and potash but a decided response to nitrogen and that where a complete fertilizer is used there is a response corresponding to that secured with nitrogen alone, they prove in the most effective way possible that phosphoric acid and potash are not needed and that the nitrogen contained therein is responsible for the results obtained with the complete fertilizer. In such a case it is clear that the application of potash and phosphoric acid would be equivalent to throwing away money.

So far as is known, no fertilizer experiments of this character have been made with figs on any soil. It is a common observation, however, among those who have given some attention to the growing of figs, that they require relatively large quantities of lime, and fig trees are frequently found growing exceptionally well on calcareous soils or those on which there are deposits of oyster or other shells. The soils in the Gulf coast region of Texas, where figs are being grown more or less successfully in orchards, contain much more lime than many soils east of the Mississippi River, where figs planted in soils deficient in lime have generally failed.

In many cases figs have been planted in soils too poor for the successful production of any crop. Many of the soils that have been used for figs are lacking in humus, and where there is a deficiency of humus nitrogen is also likely to be deficient.

While most fig growers use no fertilizers on their figs, many apply them to a greater or less extent. Some growers use bone meal at the rate of 1 or 2 pounds per tree, some use raw phosphate, some various brands of complete fertilizer, some stable manure, etc. The usual time of applying commercial forms of plant food is in the spring, at about the time the trees resume their growth.

It is not possible to recommend any particular line of treatment for figs so far as the use of fertilizers is concerned. It is doubtless wise, at least until other evidence is available, to accept the prevailing opinion that an abundant supply of lime is necessary. It is also highly important to keep the soil well supplied with humus, because of the relation of humus to soil fertility. If experience has

shown in the growing of staple crops that any particular soil is deficient in some special plant food it is probable that the same food would be needed for figs. The means which have been found efficient and economical, locally or otherwise, in maintaining the fertility of the soil in growing other crops may safely be followed in enriching the soil for figs.

PRUNING FIG TREES.

Care needed in pruning.—Though many owners of fig trees are opposed to pruning, their contention being that the wounds do not heal and that premature decay results, the best evidence is in favor of the practice. It is true that decay very frequently has followed pruning, but it has been chiefly due to the manner in which the wounds have been made, though perhaps fig wood, when cut surfaces are exposed to the air, is less resistant to organisms causing decay than that of other fruit trees. If branches are cut off without leaving a stub or if, in the removal of small or secondary limbs, they are cut back to a point where a side branch or bud occurs, there is usually no serious difficulty in the healing of the wounds.

FIG. 9.—Fig trees bear their summer crop on the new growth. This is the only fig crop that is of much importance in the South Atlantic and Gulf States. The drawing here reproduced was made from a photograph and shows the development of a fruit in the axil of each leaf. As the branch grows and a new leaf puts forth, another fruit develops in its axil.

Reasons for pruning.—Fig trees and bushes are pruned to keep the tops open to the sunlight and air, to keep them within bounds, to remove dead wood and interfering branches, to make the harvesting of the fruit easy, and to bring about economy in cultivation and the betterment of the fruit.

The bulk of the crop in the South Atlantic and Gulf States, and in the case of most varieties the whole crop produced is borne on wood of the current season's growth, as shown in figure 9. A single fruit develops in the axil of each leaf, and as the branch elongates and

new leaves put forth, other fruits develop. Therefore, in addition to the reasons just mentioned, the pruning of fig trees has as one of its most important objects the stimulating of new wood growth, in order that adequate bearing surface for a large quantity of fruit may be produced. Varieties differ widely, however, in the amount of pruning necessary for their growth and fruit production.

Pruning should be done annually, during the dormant period of the trees, preferably after the coldest weather of winter is past but before growth starts in the spring.

Fig trees growing in yards and about buildings rarely are pruned, but are allowed to grow at will, as is suggested by figures 2 to 5, inclusive. The tree shown in figure 2 may have been pruned when it was young, solely with a view to removing the lower branches, but probably no other pruning has ever been done.

The pruning of fig trees at the time of planting has been described (pp. 12–13), and the differences between a fig tree and a fig bush pointed out. Corresponding differences naturally follow in the pruning which the trees should receive in subsequent years. These differences, however, have to do with details rather than with fundamental principles.

Tendency to form bushes.—Where figs are grown in tree form there is a single trunk, as shown in figure 2. Figure 3 shows a typical fig bush, which ordinarily is composed of several stems or trunks of nearly equal prominence, all coming directly from the ground. Though not apparent in the illustration, the group shown in figure 4 is composed of two clumps of sprouts which have all the essentials of a fig bush, except their large size.

In fact, there are relatively few fig trees in the entire fig belt. Most young trees have a strong tendency to send up sprouts from the roots, and these sprouts in many instances have been allowed to grow, thus, in effect, changing trees into bushes. Others have been pruned from the beginning with a view to growing the bush form. Again, there are comparatively few trees in the South Atlantic and Gulf coast belt more than 5 or 6 years old which have not been killed back heavily at one time or another by low temperatures. Such trees habitually have sent up from the roots a considerable number of sprouts, several of which have been allowed usually to grow.

The difference in the pruning of varieties from the standpoint of their growth and fruit-bearing characteristics is strikingly illustrated by the treatment of the two most prominent varieties grown in these regions—the Celeste, east of the Mississippi River, and the Magnolia in Texas. Both varieties are of some importance in

Louisiana. Hardly any two growers follow the same system, however, or entertain the same ideals with reference to pruning.

Pruning Celeste fig trees.—In the systematic pruning of trees of the Celeste variety the annual growth is headed back somewhat, as shown in figure 10. This shows a fig pruned to a low tree form as it appeared after its third season's growth. At the end of the first season's growth the limbs were headed back slightly at the points where the lower branches have developed, and the inside branches were cut off to make the top open. The same plan was followed after the second year's growth. The growth in 1915, the third season,

FIG. 10.—A Celeste fig tree after completing its third season's growth in an orchard in southern Alabama. It was pruned systematically each year to a low tree form. The interior growth has been pruned out more or less, making an open top. The soil was well cultivated during the earlier part of the season.

consisted mostly of the short side branches that appear on the upper portion of the limbs, though the main branches have lengthened somewhat. The tree shown in its fourth season's growth in figure 11 has been pruned in the same manner as that illustrated in figure 10.

Thus, the annual pruning has consisted of a slight heading in when the trees were young, and such thinning out of the branches as was necessary to keep the tops fairly open. This is adequate, as a rule, and in general the same practice may be followed as the trees become older. The same principles apply whether the tree

or bush form is grown. In the case of the latter, from four or five to perhaps eight or ten sprouts or stems are allowed to develop. At the right in figure 12, trees of the Celeste fig are shown which were headed rather high when planted and which have not had much, if any, heading back since. The main limbs have not branched as much as usual; hence the tops are very open.

Figure 13 shows a Celeste tree about 21 years old which formerly received systematic pruning, but in recent years has been much neglected. The annual growth is very small and was made at the extremities of the older limbs. Probably a rather heavy cutting back would stimulate a more vigorous growth of fruit-bearing wood.

FIG. 11.—This is a Celeste fig tree, comparable with the one shown in figure 10, but is in the midseason of its fourth year's growth. The two trees have been pruned and managed in the same way.

Pruning Magnolia fig trees.—The Magnolia trees, of which the orchards in the Gulf coast region of Texas are largely composed, are very much more systematically pruned than the trees of the Celeste and other varieties grown elsewhere in the fig belt. The Celeste represents a type of fig tree that usually should be cut back only slightly. The Magnolia, on the other hand, represents a type which apparently does best when pruned on what is practically a renewal system. This is illustrated in figure 14, which shows a block of 3-year-old Magnolia trees that have been cut back heavily at the annual pruning during the dormant season. Figure 15 shows a row of trees in an orchard 9 years old, as it appeared the last of August. The trees in this orchard were annually headed back even more heavily than those shown in figure 14, the branches being cut to mere stubs not more than 1 or 2 feet from the ground. The growers who follow this plan of very heavily cutting back the annual growth each year are convinced that it induces a heavy growth of new wood from near the roots, that the fruit produced on this growth is

larger and better than that borne on trees less heavily pruned, and that the cutting back considerably lengthens the fig season.

While most of the growers of the Magnolia variety practice rather heavy shortening of the annual growth, not many follow the extremes illustrated in figures 14 and 15. Figure 16 shows the more common method, particularly where the original top has been killed by low temperatures. This fig was doubtless planted to be grown in the tree form, similar to the Magnolia trees at the left in figure 12, but in the winter of 1910 many fig trees in Texas were heavily killed back, and at that time the original top of this tree suffered severely. Of the sprouts which grew from the roots, 10 or 12 were allowed to remain, as may be seen in the illustration. Apparently little pruning was done the first year or two following the freeze,

FIG. 12.—Important differences in the pruning of different fig varieties are shown in this orchard, which is at Pasadena, Tex. The trees at the right, which are of the Celeste variety, have been cut back only slightly or not at all in the annual pruning, while the Magnolia trees at the left have been heavily cut back. The leaves which had started to grow on the Celeste trees were killed by a freeze about two weeks before the picture was taken, which was on April 6, 1915.

but during the two or three years preceding the time when the picture was taken more severe heading back was done, as is shown by the development of rather numerous branches toward the extremities of the main limbs and by their "stubby" appearance.

The tree in figure 17 passed through the same stages as the one shown in figure 16. It has been headed back heavily, as indicated by the stubs of the limbs in the top of the tree, and has received the same general pruning as the one shown in figure 16 except that the small sprouts which developed from the roots have been allowed to grow. These should be removed at the next annual pruning. It would be better to cut off such sprouts as soon as they appear, instead of allowing them to develop.

Figure 18 shows a Magnolia fig pruned to the bush form from the beginning, the number of sprouts allowed to develop being definitely limited to four. The annual growth has also been cut back rather

severely each year. This definite system of a 4-stem bush is being maintained in one large commercial orchard, in order to determine whether this system or a single-stem tree form is preferable.

Pruning to form bushes.—Figures 19 to 22, inclusive, further illustrate the systematic, progressive pruning of fig trees to the bush form over a series of years. These figures show trees of the Magnolia variety, or of one hardly distinguishable from that sort, that were planted and have been cared for continuously by the present owners and show the systematic working out of a definite plan of pruning. When planted, the trees were headed low, thus inducing the develop-

FIG. 13.—This is a Celeste fig tree near New Orleans and is about 21 years old. It has a small bearing surface for so large a tree. The reason is that pruning has been much neglected in recent years, and the new annual growth made near the extremities of the limbs is very short.

ment of sprouts from below or very near the surface of the ground, the bush rather than the tree form of growth being preferred by the growers.

Figure 19 shows a bush in its second season's growth; the low branching incident to low heading is to be noted. The first season's growth was cut back to within 1 foot of the ground. The present top consists of a rather small number of limbs, which are probably 4 to 6 feet in length. Fruit developing in the axils of some of the leaves can be seen.

A bush in its third season is shown in figure 20. During the dormant period the second season's growth was cut back heavily, which resulted in more branching and the development of a larger number of limbs in the third season than in the one preceding.

Another year's progress in size and development is pictured in figure 21, which shows a bush pruned as above outlined in its fourth season. One in its fifth season is shown in figure 22. The much-branched basal portion of the bush is also shown in this illustration. The general form of branching and the cutting back that has been done are better illustrated in figure 23, which shows the interior of the base of a fourth-year bush. The stubs and series of branches to

FIG. 14.—This shows how 3-year-old Magnolia fig trees in the Gulf coast region of Texas, look in the spring before growth starts, where the previous season's growth has been cut back heavily each year in the annual dormant pruning.

be seen in figure 23 show the successive heading back that was done during the first two years.

A modified system.—The owners of the orchard in which the trees shown in figures 19 to 22 are located now practice the heavy heading back illustrated for about the first three years only. In subsequent years they cut back the annual growth about one-third or one-half its length, a method differing somewhat from that described in connection with figure 15. When it is desirable to make the tops more open it is done by removing entire limbs rather than by cutting back.

It is also considered a good plan by these growers to pinch back the terminal bud of the annual growth about the first of August, or as soon after a desirable quantity of fruit has set as it can be done without inducing the growth of new side branches. This pinching back checks the elongation of the annual growth, thus preventing

the setting of more fruit. It is claimed that this makes the fruit already formed develop to a larger size and ripen more uniformly than it otherwise would.

Avoid long stubs.—The long dead stubs shown in figure 23 are seriously objectionable, as decay is likely to set in eventually at these points. The branches should have been cut off even with the surface of the limb on which they occur, leaving no stub. If the wounds incident to pruning are properly made, as above indicated, very little difficulty in their healing is likely to occur. On the other hand, where stubs are left, the wounds can not heal, and decay may be expected to follow. The fact that stubs are so often left in pruning and that decay results is doubtless the cause of the conviction in some sections that wounds made in pruning figs do not heal.

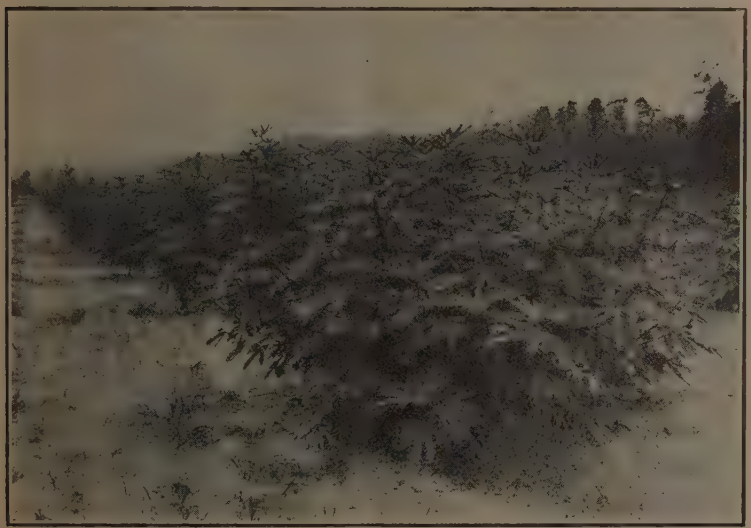

FIG. 15.—These are 9-year-old Magnolia fig trees at Bonami, La., in midsummer, which have been systematically pruned on what is practically a renewal system. The branches have been cut back each dormant season to mere stubs 1 or 2 feet from the ground. The cutting back has been considerably more severe than that shown in figure 14.

FIG DISEASES.

The fig is subject to several diseases, some of which affect the fruit, others the twigs or branches, and still others the foliage, but the control of these diseases has received little attention.

The soft-rot of the fruit and the rust which occurs on the foliage are probably the most widespread and by far the most important of these diseases.

SOFT-ROT.

The fungus which usually produces soft-rot is the very common black mold which develops frequently on moist bread and many other vegetable substances, especially in the presence of considerable moisture. Its occurrence on figs is much more serious during hot, muggy, or rainy weather than when the atmosphere is comparatively dry.

FIG. 16.—This fig bush shows the method of pruning the Magnolia variety followed by many growers in the Gulf coast region of Texas when the figs have been winterkilled at some previous time. The original top of this bush was severely frozen back. It is here seen in the late summer of the fifth season following the injury.

Figs, as they approach maturity, are particularly susceptible to this decay organism, and if conditions happen to be especially favorable to its development when the fruit is ripening, a large part of the crop may be lost from soft-rot.

No very effective methods of control can be suggested. Some varieties are less susceptible than others, and fortunately the Celeste, which, except in Texas, is much more extensively planted than any other variety, is one of the less susceptible sorts. Keeping the tree well pruned so that the top is open and every part freely accessible to air and sunshine will promote the drying after rains, and this will tend to retard decay. Picking the fruit frequently and as soon

as its degree of maturity will permit is also advisable, since its susceptibility to decay increases as it matures.

RUST.

Rust, which occurs widely throughout the South Atlantic and Gulf States wherever figs are grown, is rather serious. Often the trees are completely defoliated by it in August or early September. Where this occurs, new leaves usually put forth before the end of the season. While as a rule the apparent depletion of the vitality

FIG. 17.—This Magnolia fig bush in an orchard near the one shown in figure 16 has suffered the same injury from freezing, but the small sprouts that grow annually from the roots have not been trimmed out. It is shown here as it appears in early September. A pail or bucket for holding the figs is commonly used by the pickers when the fruit is being gathered.

of the trees from this disease is less than might be expected, the general effect where repeated from year to year must be injurious.

The affected leaves first show some light-colored pustules or pimples on the under side. Their number increases until the lower surface is practically covered. The leaves then begin to die and in a comparatively short time drop off.

The diseases of the group to which this rust belongs are difficult to control by spraying. Little, if any, information resulting from carefully planned investigations is available regarding methods of controlling fig rust. However, the progressive growers in Texas and, in a few instances, elsewhere spray their fig trees more or less systematically with Bordeaux mixture for the control of rust, with

considerable success. The mixture used is generally made of 4 or 5 pounds of bluestone and 5 or 6 pounds of lime to 50 gallons of water, though some use a considerable excess of lime, 8 to 10 pounds, instead of the smaller quantity mentioned.

The spraying program varies with different growers. Some make three or four applications at intervals during the growing season. Others watch the trees closely and spray whenever there is evidence of the disease developing. One of the largest growers sprays every 10 to 15 days, beginning before the trees start growth in the spring and continuing through the period of most active growth. This

FIG. 18.—Many figs are planted as trees, but later they become bushes as the result of freezes and the growth of sprouts. This Magnolia fig near Brazoria, Tex., was trained from the beginning in bush form, the main limbs being limited to four. It is in its fourth season's growth and is here shown as it appeared in late summer.

grower considers the dormant spray the most important application in controlling rust.

While no special spraying program can be advised, the several practices of different growers referred to appear to afford a good measure of protection against the loss of fig foliage from this disease.

INSECT PESTS OF FIGS.[1]

The well-ordered fig orchards of the South Atlantic and Gulf States are not particularly susceptible to the attacks of insects of serious economic importance. This is especially true with fig trees continuously receiving proper cultural attention. The most serious

[1] By J. R. Horton, Scientific Assistant, Bureau of Entomology.

depredations caused by fig insects are on isolated trees grown for ornamental purposes and trees in dooryards in the cities.

The insects which most often attract attention on fig trees are the three-lined fig-tree borer,[1] the common mealy bug,[2] and the soft brown scale.[3] The work of three or four species of wood-boring beetles—chiefly that of the fig-tree borer—undoubtedly occasions more apprehension than the combined injury of all the other insects mentioned.

THREE-LINED FIG-TREE BORER.

The three-lined fig-tree borer has been definitely identified as damaging fig trees in Louisiana and Texas only, though it is possible

FIG. 19.—The fig bush here shown is in midsummer of its second season from planting. It was pruned during the preceding dormant season on a renewal sysem similar to that employed with the bushes shown in figure 15. The orchard is at Winnie, Tex. Figures 20, 21, and 22 show trees in the same orchard of the same variety, but of different ages. The same system of renewal pruning is often followed in pruning Magnolia figs.

that it occurs in Alabama and Florida as well. The mature beetle is a gray-brown insect with three scalloped white stripes, one on each side and one in the center of the back extending almost the full length of the insect. The female averages nearly 1 inch long by one-fourth of an inch wide; the male is smaller, sometimes only five-eighths of an inch long by three-sixteenths of an inch wide. The antennæ are more than twice as long as the body. The larva, or borer proper, is a white or nearly white legless "sawyer," varying

[1] *Ptychodes vittatus* Fabr. [2] *Pseudococcus citri* Risso. [3] *Coccus hesperidum* L.

in length from about one-eighth of an inch at hatching to 2 inches or more when its growth is completed.

The beetles usually make their first appearance in March and soon thereafter begin to deposit eggs, continuing to do so throughout the summer. Egg laying is greatly retarded from October to January and generally ceases completely during January and February. The eggs are deposited in the bark of the trunk and larger branches, almost exclusively near a diseased or injured area or in a cut or broken stump, and hatch in from three to eight days. The females live from three to eight or nine months and deposit from 130 to 260 eggs each. The young sawyers feed along in the bark or near the surface for

FIG. 20.—This fig bush is in the midsummer of its third season from planting and shows an increased number of branches, compared with the bush in figure 19, as a result of heavily cutting back the preceding season's growth.

from one to three weeks, then usually work deeply into the wood, often going to the very heart of the branch or trunk. The larvæ continue to mine along in the wood for two or three months or longer, when they enter the resting or pupal stage and finally emerge as fully developed beetles. Except when they become excessively numerous in a locality where there are but few trees, the three-lined fig-tree borers will not attack perfectly healthy, sound trees. A tree having broken spots in the bark, a split trunk, broken branches, or untreated wounds made by the pruning saw will often be infested by several hundred borers, while a perfectly sound tree only a few feet away will remain free from attack. The borers thrive in either living or

dead wood, but they prefer wood which is dying and that has lost a portion of its sap.

Preventive measures against this borer are better than remedial measures. The young fig tree should be properly pruned to give it the best shape to withstand heavy winds. It is very important to avoid bruising the bark in cultivation or with the ladder or the feet in picking the fruit. Whenever a branch is accidentally broken it should be cut off smooth immediately at its juncture with the larger branch, or trunk, and the wound painted with a mixture of five parts of coal tar and one part of creosote (or crude carbolic acid).

FIG. 21.—This fig bush is in the midsummer of its fourth season from planting and shows larger size but the same form as those in figures 19 and 20.

As soon as this is thoroughly dry, at least a second and possibly a third coat should be applied.

Any trees in the orchard that have become thoroughly infested with the borers should be cut down and every scrap burned, as otherwise the insects will survive in the dead wood, emerge, and injure other trees. Trees consisting of three to six volunteer sprouts from the root of a previously destroyed tree and remains of broken-down trees, such as are often found in yards in the towns, may as well be destroyed at once, as they are usually of little value and are almost sure to be a source of infestation.

Borers in individual trees which are highly prized but already infested may be dug out, if the infestation has not progressed too far and its area is limited. The eggs may also be destroyed with a sharp knife or an awl. This treatment should be given by one familiar with the appearance of the eggs and egg punctures and also with the methods of dressing and treating the cuts made in removing the larvæ. The laying of eggs may be prevented to a considerable extent by ensheathing the trunk and larger branches in wire netting. The screen must be kept in place practically throughout the year, however.

FIG. 22.—This fig bush is in the midsummer of its fifth season from planting and shows the accumulated results of systematically cutting back the preceding season's growth at each annual pruning, which is done during the dormant period. The much-branched basal portion of the bush is here seen. It is in the same orchard as the bushes shown in figures 19, 20, and 21.

COMMON MEALY BUG.

The common mealy bug often becomes numerous on the branches and leaves of the fig tree in the South. In Louisiana, in the territory of the Argentine ant,[1] which retards the work of their enemies, the mealy bugs sometimes become very plentiful in April, May, and June, with considerable resultant smutting of the leaves and small fruits. Occasionally they persist in some numbers until about the middle of August, by which time they are, however, rapidly disappearing, owing to the activities of numerous effective enemies. Where the

[1] *Iridomyrmex humilis* Mayr.

Argentine ant is not present they usually disappear almost completely from the trees by the last of May; often earlier than that.

SOFT BROWN SCALE.

The soft brown scale also occurs to some extent on fig trees in the Gulf States. This insect settles in groups on certain branches and

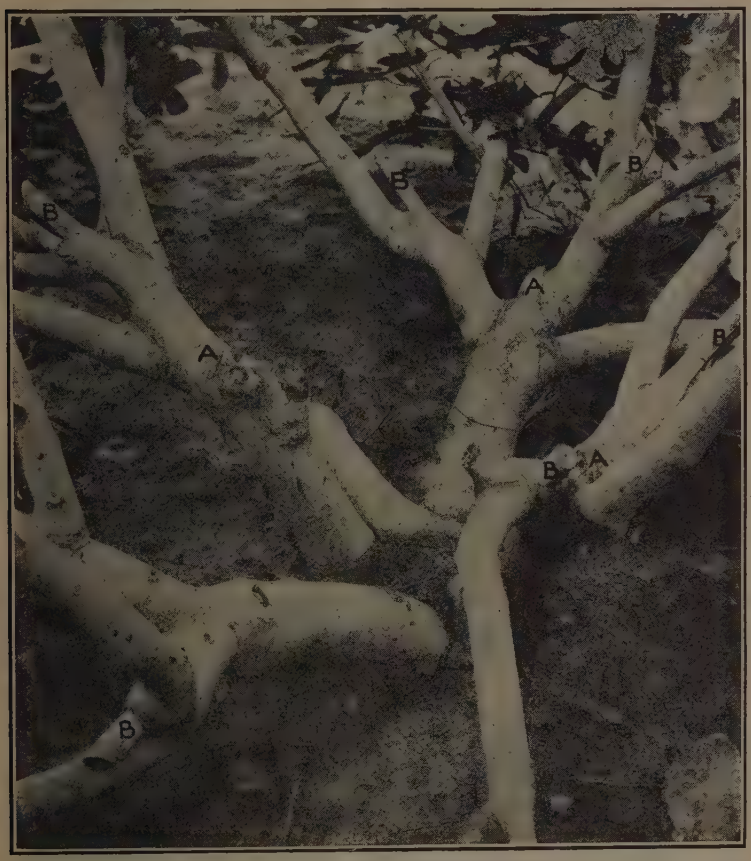

FIG. 23.—This view of the interior of the basal portion of a fig bush in its fourth season illustrates some of the details of pruning. The first season's growth was cut back to *A*; the second to *B*. The dead stubs that are to be seen are objectionable. They will not heal over and will eventually decay. In all pruning great care should be exercised in removing branches to cut so that no stubs will remain. (View in the same orchard as figures 19 to 22.)

along the lower surface of the leaves near the midrib. At times these groups become quite populous and cause a certain amount of smutting of leaves and fruit. This insect, however, is kept under con-

trol for all practical purposes by natural agencies under all conditions that have so far arisen.

OTHER INSECTS.

In Smyrna the larva of the fig moth [1] bores into the figs, sometimes causing a large percentage of wormy fruit. It has not yet been imported into the United States, so far as known, and owing to the inspection of the Federal Horticultural Board it is improbable that it will be introduced.

Some noticeable and widely distributed insects are injurious to the fig, though not specifically fig pests. For instance, June bugs, bees, and wasps are frequently seen on figs, apparently eating the fruit; but rarely if ever, are they the original cause of injury. Where the fruit cracks or the skin is broken in any other way, the insects mentioned commonly take advantage of the injury and eat the fruit to a considerable extent. The actual damage, however, is comparatively slight, as the fruit that cracks or is injured mechanically is likely to ferment and spoil in a comparatively short time if it is not promptly picked. No special remedial measures can be suggested.

PESTS OTHER THAN INSECTS.

Birds.—Birds of various kinds often eat quite a lot of fruit, but they rarely eat fruit that has not previously cracked or been injured in some way so as to expose the flesh. Cracking is especially likely to occur when the fruit ripens in damp or rainy weather.

Nematodes.—Probably nematodes are of greater economic importance in fig growing than any other parasite. These nematodes are very minute eellike or wormlike organisms which are so small that they can hardly be seen without a microscope, except by a carefully trained eye. They live in the small roots of the plants, causing the characteristic knotlike swellings, or nodules, which occur on many kinds of plants growing in mild climates. In colder regions, where the ground freezes deep for long periods at a time, comparatively little damage is caused by nematodes. In the South they cause great losses in crop production.

It is impossible to state the extent to which nematodes may limit the growing of figs. It is known that the roots of fig trees are very susceptible to them and that the root nodules which indicate their presence occur in great numbers practically everywhere that fig trees are to be found. It is at least reasonably sure that they have added materially to the effect of other difficulties encountered in fig orchards

[1] *Ephestia cautella* Walk.

that have failed. Nematodes are known to work more seriously in very light, loose, sandy soils than in the heavier types, and the fig orchards that have failed usually have been planted on such soils. Little can be suggested in the way of means of controlling nematodes in fig plantings.

FIG VARIETIES.

The writer does not know of any widely grown variety of edible fig that has originated in the United States. The type of fig grown in the South does not usually develop seeds that will grow. Hence the opportunity to obtain valuable varieties from chance seedlings is lacking, which is not the case with our other fruits.

Many seedling fig trees are growing in the South, but in practically all cases they appear to have grown from seeds of imported Smyrna figs (the common imported dried fig of commerce, which is also produced in considerable quantities in California). The Smyrna type of fig does not develop its fruit to maturity as a rule except when it is pollinated, and pollination is effected only by a certain kind of insect, known as a Blastophaga, which lives over winter in what is termed a caprifig. Caprifigs produce pollen, but their fruit is of little or no value for edible purposes. As this insect has not yet been definitely established in the South there is no means whereby the Smyrna seedling figs can be pollinated. This fact is of considerable importance, as a question frequently asked is why certain fig trees drop their fruit when it is only partly developed. There is occasionally an apparent exception to the rule that Smyrna seedlings require pollination, but it is not of special importance in this connection. The matter of establishing the Blastophaga in the South is under investigation, but the results, though rather promising, must be carried considerably farther before recommendations or advice can be given.

As previously stated, the Celeste is the variety very largely grown throughout all but the Texas portion of the fig belt. In the Gulf coast region of Texas the Magnolia is of similar or perhaps even greater relative importance than the Celeste is elsewhere. Trees of the Celeste, as well as of other varieties, occur occasionally in Texas, but in such small numbers as to be unimportant.

Other varieties that occur more or less in Louisiana and eastward are the Black Ischia, Brunswick, Ischia (*White Ischia, Green Ischia*), Lemon, Turkey (*Brown Turkey*), and occasionally others of small relative importance. Of this list of secondary varieties, the Brunswick and Turkey (particularly the latter) are of greater importance than the others.

CHARACTERIZATION OF FIG VARIETIES.

[It should be explained that a fig tree may produce one, two, or even three crops of fruit in a year, depending upon the variety and the conditions under which it is grown. In a general way these crops are seasonal and develop at different periods in the year. Any one or any two of these crops may be wanting in any variety; in fact, two of them, the first and third, are usually wanting under the conditions that prevail in the South Atlantic and Gulf States. A few varieties sometimes produce first and second crops. The Turkey (*Brown Turkey*) does this more commonly than most varieties, though several others occasionally develop small quantities of fruit in this crop. The crop which corresponds to the second is the main and really important one throughout the regions under consideration, while the third crop is rarely produced there. It is therefore the second crop that is referred to in the characterization of varieties that appear under this heading.]

Black Ischia.

Fruit medium in size; skin bluish black; pulp crimson; quality good. Season begins about the middle of July. Tree regarded as less hardy than Ischia (*Green Ischia*).

Brunswick.

Fruit large to very large, broadly pear shaped, ribs well marked; skin bluish purple to dark brown; pulp white or nearly so under the skin, shading to pink toward the center, thick, soft; quality good to very good. Season begins last of July and continues for some weeks. A variety more or less planted under the name "Jennings" is commonly said to be identical with the Brunswick.

Celeste. (Synonyms: *Celestial*, *Sugar.*)

This variety is better known under the first synonym mentioned than by its approved name. It is by far the most widely and extensively planted variety in the fig belt outside of Texas. It is considered a standard of hardiness and can be grown where less hardy varieties fail. Probably to this fact more than to any other is due its wide distribution.

Fruit small to medium, pear shaped, ribbed; skin violet, sometimes shading to purplish brown; pulp whitish, shading to rose color at the center. Its season throughout the regions where it is important begins about June 20 to early July and extends for a period of three or four weeks.

Ischia. (Synonyms: *Green Ischia*, *White Ischia.*)

Fruit medium in size, long; skin pale green; pulp crimson; quality good, with rich, sweet flavor. Season begins about the first of August, continuing until frost.

Lemon.

Fruit medium to large, flattened, slightly ribbed; skin yellowish green with light oval dots, brownish on exposed side; pulp whitish under skin, darker towards the interior; quality only fair, sweet. Season begins the last of June or early July, continuing for several weeks.

Magnolia.

This variety practically makes up the commercial fig industry of the Gulf coast region of Texas. It does not appear to be well adapted to the regions east of the Mississippi River, various re-

ports indicating that the tree makes a rather weak growth and that the fruit cracks badly. It is grown to a limited extent in the western part of Louisiana, where it succeeds fairly well.

Fruit large; skin greenish amber or pale green; quality good. Season begins about the middle of July and continues until frost.

A few growers in Texas have a variety known as the "Texas Wonder," which is very similar to Magnolia and may be identical with it; it is claimed that it is better in some respects than the Magnolia.

Turkey. (Synonym: *Brown Turkey.*)

This variety generally is referred to by its synonym. The tree is commonly considered nearly as hardy as the Celeste, and at some points along the South Atlantic coast it is grown in preference to the latter.

Fruit medium to large, broadly pear shaped; skin coppery brown; pulp whitish, shading to pink about the seeds; quality good to very good. Season begins about the middle of July and continues for two months or longer.

Florentine.

About eight or ten years ago the attention of Mr. W. J. Warrington, of Alexandria, La., was attracted to two fig trees on his place because of their superior merit. These trees were labeled Florentine, but unfortunately no record was made of the source from which they were obtained. Being convinced of the value of the variety, Mr. Warrington has endeavored during the last few years to bring it to the attention of fig growers in the Gulf region.

Fruit medium to large; skin pale green; pulp yellowish to amber; is said to keep after picking much better than most varieties. Season begins in July and continues until frost. The tree is reported to be very vigorous and hardy and to bear well.

The variety appears to have many points of merit and should be thoroughly tested in the South Atlantic and Gulf fig belt.

Ramsey.

This variety originated as a seedling at Austin, Tex., about 1908, and was introduced to the trade in the fall of 1915 by F. T. Ramsey & Son, of that city. Its special points of merit are its productiveness and good size. The fruit is said to crack less than the Magnolia. Though not widely tested, it has sufficient merit in the locality where it originated to warrant fig growers in giving it some attention.

Nameless.

Late in the autumn some 10 years or more ago, Mr. L. E. Hall, of Hattiesburg, Miss., purchased a farm near that place on which was a small, neglected fig tree that attracted his attention because of the size, appearance, quality, and lateness of its fruit. In due course Mr. Hall became convinced of the merits of this fig. As all his efforts to identify the variety failed, he concluded that it was without a name, at least so far as could be determined; hence he called it the "Nameless." Under this name he has disseminated the variety for commercial purposes.

The fruit is medium to large; skin purplish red where well exposed to light and sunshine; quality good, with rich, sweet flavor. Season extends from early August until frost.

The best results with this variety have been obtained when the growth has been cut back practically to the ground each fall after it becomes dormant, as described for the Magnolia. The fruit is larger and develops better than when less heavy pruning is done.

With this method of cutting back Mr. Hall has found that the stumps which remain after the pruning is done can be completely covered with soil in the late autumn at a very small expense for the necessary labor and thus effectually protected against possible injury from cold during the winter.

Though the range of adaptability of this fig is practically unknown, its apparent merits in the vicinity of Hattiesburg, Miss., suggest that it is worthy of a trial throughout the fig belt.

HANDLING THE FRUIT.

Where figs are grown in a climate more or less arid, as in California, the fruit can be left on the tree without deterioration until it is ripe enough to drop of its own accord. When this stage of ripeness is reached the fruit is partially dried.

Use figs as fast as they ripen.—The figs grown in the humid regions of the South Atlantic Coastal Plain and the Gulf regions are very perishable. Some varieties are less perishable than others, but all the figs grown in that region ferment and sour under ordinary conditions within a comparatively short time after they are picked. Prompt utilization of the fruit as it ripens is therefore necessary, especially in damp, muggy, or rainy weather, when figs spoil more quickly than they do in bright, clear weather.

During the last few years increased attention has been given to canning and preserving figs in the home, and in Texas in commercial canneries as well. In some sections the surplus fruit from the small home plantings is collected each year by those equipped to handle it, canned in considerable quantities, and sold to people in the North or elsewhere. Many girls' canning clubs have engaged in work of this type. A few canneries outside of Texas operate on a commercial scale with figs, but in such instances the bulk of the fruit used is produced on trees growing in dooryards and about buildings.

Figs are not suitable for eating in the fresh state until fully ripe, and when in that condition the fruit becomes soft. For shipping, canning, or preserving in other ways, the fruit should be picked before it begins to soften, but not until it is fully grown and at the point of beginning to soften. The exact stage of maturity is learned only by experience.

Handle with care.—In picking, the fruit is commonly placed in 10 or 12-quart pails, or buckets, as shown in figure 17. The milky juice which exudes from the stems of the figs when they are picked at the

stage of maturity preferred for shipping and canning is very irritating to the flesh. Pickers should take pains to prevent the juice from coming in contact with the hands as far as possible; otherwise serious sores, especially on the fingers, may result. The foliage is also more or less irritating to the flesh, and care should be taken by pickers to avoid coming in direct contact with it more than is absolutely necessary. Various methods of protecting the hands and arms are used by pickers. Some pickers wear gloves or rubber finger tips. Others smear beef suet or some other form of grease or oil on the hands, and also on the arms where the latter are exposed. Frequent washing of the hands in vinegar is said also to counteract to some extent the effect of the juice.

SHIPPING FRESH FRUIT.

As the fruit spoils in a short time after it is picked, the marketing of fresh figs is confined largely to the locality where they are grown or to destinations that can be reached by express within a few hours after the fruit is picked.

Shipping under refrigeration would doubtless materially widen the radius of distribution, but except in Texas figs are not now grown at any point in these regions in a sufficiently large quantity to permit shipping in car lots; hence refrigerator-car service is impracticable at present.

Containers.—When prepared for market, fresh figs are usually placed in quart baskets, like those in common use in shipping strawberries and other small fruits, and these baskets are packed in ordinary 24 or 32 quart crates. Occasionally the 6-basket or Georgia peach crate is used, but in this style of package the individual containers are too large to be suitable in view of the delicate character of the product, and the figs in the bottom of the baskets are often crushed or badly bruised from the pressure of the fruit above them.

To a limited extent figs are packed in specially-made pony refrigerators, similar in their general features to those used very early in the season in shipping strawberries from Florida to the northern markets. This method is successful for the specialist, but probably not practicable for the average grower. However, the use of these refrigerators has demonstrated the possibility of reaching more distant markets with figs when the necessary details of handling and transportation are carefully observed.

UTILIZATION OF FIGS.

Practically the entire fig crop of Texas is canned, the fruit being handled in local canneries at the important centers of production. Because of the very perishable character of the fruit, a cannery

so located with reference to the place of production that the figs can be delivered to it within a few hours after they are picked is practically an essential to the successful handling of the crop. Figure 24 shows the exterior of a more or less typical fig cannery in Texas. In the Gulf coast region of Texas, where the Magnolia variety is largely grown, the canning season begins from the middle of July to early August and continues until frost occurs, if crop conditions are favorable.

For the best results the fig trees should be picked over every day at the height of the season or every other day when the fruit is ripening slowly. In this way figs of a uniform degree of maturity can be secured. If the fruit is too ripe, it will not retain its form when cooked. It is only when every fruit in a can retains its form that a product of the hightest grade is secured.

FIG. 24.—Nearly the entire crop of figs in Texas is put up in local canneries. The canning season begins in July or August and usually runs till frost occurs. Practically all the figs handled in these canneries are of the Magnolia variety. (Photographed at Fig Ridge, Tex., August 3, 1916.)

How figs are canned in factories.—Each canner has his own particular practices as to details, and in most cases these are rather jealously guarded. In general, however, the process consists in dipping the fruit for a few seconds in a boiling-hot solution of lye in order to remove the skin, washing in several changes of water to remove the lye, cooking in a heavy sirup for two to four hours, and packing in tin cans or glass jars.

It is the figs of the Magnolia variety especially from which the skin must be removed in order to obtain a particularly high-grade canned product. The lye solution should be strong enough to remove the skins quickly; this requirement should regulate the amount of lye used in a given quantity of water rather than any fixed proportions. A pound of lye to 10 or 12 gallons of water is sufficient for

most kinds of fruit. The washing of the fruit after the lye bath is accomplished preferably in running water, though dipping it in several water baths which are frequently renewed with fresh water will serve the purpose. Long cooking thoroughly impregnates the fruit with the sirup. When packed in glass jars each fruit is carefully placed with stem uppermost, so that the contents of the jars present a very symmetrical, attractive appearance. Figs so packed are ordinarily very high priced.

Considerable quantities of figs are commercially canned also in some portions of the fig belt outside of Texas. At a few points there are small canneries of some local importance in which figs only are handled, while in others canneries engaged primarily in putting up oysters, shrimps, and other marine products make a "run" on figs for a few weeks during the height of the season of the Celeste variety, that being the only variety produced in most localities in sufficiently large quantities to be important from a commercial standpoint. Celeste figs are usually canned without removing the skins.

The figs used at these canneries are produced mostly by dooryard and garden trees, which in the aggregate supply considerable quantities of fruit. The fruit from these numerous growers is commonly brought together at convenient centers, and from such centers it is taken to the canneries.

The price usually paid for the fruit is 3 cents per pound for the best grade. A lower price prevails for the lower grades.

HOME METHODS OF PRESERVING FIGS.[1]

Except in Texas, the utilization of figs in the sections covered by this bulletin is essentially a problem for the housewife.

Considered with reference to food value, figs are among the first in the list of our fruits. None should be allowed to go to waste. Only the fully ripe figs are suitable for eating fresh, but the unripe as well as the overripe fruit may be preserved to advantage. The fresh ripe fruit is desirable for canning, preserving, etc., the overripe figs for making jams, marmalades, and confections, and the unripe fruit for sweet pickles. Figs add variety to the diet, are acceptable in many forms, and may be made into delicious confections.

Directions for the preservation of figs by the various methods and suggestions made by practical housewives and others are given below.

CANNING FIGS IN THE HOME.

Use firm, well-ripened but not overripe freshly gathered fruit. Blanch, or scald, in a hot soda solution prepared by dissolving 1 cupful of baking soda

[1] Compiled by C. A. Magoon, Assistant Plant Physiologist in Fruit and Vegetable Utilization Investigations, Bureau of Plant Industry.

in 6 quarts of boiling water. The fruit is placed in this solution while still boiling hot and allowed to stand 15 minutes, but without additional heating. Drain off the solution and wash the figs in several changes of clear cold water. Drain and cook for 40 to 60 minutes in a sirup prepared from 1 part of sugar, or corn sirup, and 2 parts by measure of water. Pack the figs in jars which have just been sterilized by boiling in water and which are still hot. An attractive product is obtained if the figs are carefully arranged in the jars with all stems pointing upward. Cover the fruit in the jars with the hot sirup, adjust freshly scalded rubbers, and put on the covers, but do not seal at this time. Now process—that is, boil—the fruit thus packed in the jars in a hot-water canner if one is available. If not, the processing may be done in an ordinary kettle or a wash boiler with a tight cover and a false bottom of wire netting or strips of wood to prevent the jars from coming in contact with the bottom of the vessel. The water in the vessel should be of such depth that the cans are nearly submerged. Pint jars of the fruit should be processed in this hot-water bath for 30 minutes; quart jars for 40 minutes. The time should be counted from the time the water begins to boil. At the completion of the processing, screw down or clamp the covers tightly, thus sealing the jars. Remove from the water, protect from cold drafts in order to prevent the jars from breaking, and, when cool, label and store.

FIG PRESERVES.

Select and prepare the fruit as for canning. Prepare a sirup by boiling together for 10 or 12 minutes 2 parts of sugar, or corn sirup, and 3 parts by measure of water. Skim, if necessary. Add the well-drained fruit gradually, so as not to cool the sirup. Cook rapidly until the figs are clear and tender. When the fruit is transparent lift it out carefully and place in shallow pans. Pour the sirup over the figs, taking care that the fruit is entirely covered. Let stand overnight. Next morning pack the figs in freshly boiled jars; fill the jars with the sirup, cap, and process, as in canning them. Seal immediately, cool, and store.

FIG CONSERVE.

1 pound figs.
¾ pound sugar and 1½ pints water. (Or 1½ cups corn sirup and 2 cups water).
⅔ cup nuts.
½ orange (pulp and peel).
½ cup raisins.

Cook the figs as for preserves. Cut into small pieces, add the orange and raisins, which have likewise been cut into small pieces, and cook together for one hour. Add the nuts five minutes before the cooking is finished. Pack and seal hot. Process pint jars for 30 minutes.

FIG MARMALADE.

Use the overripe fruit, which must be treated in the hot soda bath, as described under "Canning figs in the home." Use three-fourths of a pound of sugar to 1 pound of fruit and cook together. Mash fine with a potato masher or strain through a colander. Cook until thick. Pack and process as for preserves.

FIG LEATHER.

Take very ripe figs. Wash and mash to a very fine pulp. Spread on platters and dry in the sun or in the oven. When the leather is dry, dust with powdered sugar and roll up like a jelly cake. Cut into pieces of suitable size and pack

away in jars. This leather may be eaten as a confection or soaked in water and used for pies, sauce, etc. The powdered sugar may be left out if desired.

A leather prepared by using equal proportions by measure of figs and peaches makes a very fine product.

CANDIED FIGS.

Take 4 pounds of figs (any variety) and use with them 4 cups of sugar and 2 cups of water, or 5 cups of corn sirup and a half a cup of water.

Prepare the figs as for canning. Make a thick sirup of the sugar and water (when sugar is used instead of corn sirup), add figs, and cook until they are clear. Dip out and drain. Spread on plates in the sun or place in a drier to dry. Protect from insects. Turn the figs every day and press flat. When well dried, dust with powdered sugar and pack in boxes or jars. If preferred, they may be layered in granulated sugar.

CRYSTALLIZED FIGS.

Prepare the figs as for candying. Make a thick sirup and while it is boiling drop the figs into it. Remove, drain, and dry. Repeat several times until the figs are thoroughly coated with crystallized sugar.

SWEET PICKLED FIGS.

Take 5 quarts of half-ripe figs, with stems. Put into salt water and let them stand 12 hours. Drain them, and then parboil in alum water, using a piece of alum half the size of a nutmeg dissolved in water sufficient to cover the fruit. Be careful that the skins do not break. When soft, take them out and wash them in several changes of clear water to remove the alum and drain well. Make a sirup by using a pint of vinegar and a pound of sugar. Flavor with mace, cinnamon, and cloves, and when the sirup has boiled put in the figs. Can in glass. Process pint jars for 20 minutes.

DRYING FIGS.[1]

Drying in the sun (a California practice).—In the fig-growing districts of California the drying of the fruit by exposure to the sun is much practiced. The Mission (*California Black*), Adriatic, and certain other varieties of the Adriatic type of figs and several sorts of the Smyrna type are used principally for this purpose. The growing of Smyrna figs in California for drying has developed into an important commercial industry in comparatively recent years.

In handling figs for drying in California they are allowed to remain on the trees until fully ripe or slightly shriveled, or more commonly, until they drop to the ground. Some growers grade the fruits roughly for size; then after being subjected for a considerable time to the fumes of burning sulphur they are spread in a single layer on trays and exposed to the sun. Sometimes the fruit is immersed for 5 to 10 minutes in a brine solution made by dissolving 1 pound of salt in 4 gallons of water before spreading it on the trays.

[1] By J. S. Caldwell, Plant Physiologist in Charge of Fruit and Vegetable Utilization Investigations, Bureau of Plant Industry.

In this method sulphuring is omitted, but sulphuring is habitually followed by commercial growers.

During the drying, which requires 6 to 10 days, the figs must be turned over several times. As the fruits do not dry uniformly, those which progress most rapidly must be removed from the trays from time to time as they become sufficiently dry. Figs have reached the proper degree of dryness for removal when they have acquired an elastic, leathery texture and when no moisture can be squeezed from a freshly cut surface by strong pressure between the fingers.

The dry fruit is piled to a depth of 1 or 2 feet in a well-ventilated curing room or in a large open box and thoroughly stirred at intervals of a day or so for two weeks. During this time the drying continues slowly and the remaining moisture becomes uniformly distributed through the entire mass.

Following this, the fruit is usually dipped for two to five minutes in a thin sirup made by dissolving 1 pound of sugar in a gallon of water, after which it is drained for an hour or so and then packed in permanent containers.

Southern figs not to be sun dried.—The method just described does not give satisfactory results with such varieties as the Celeste, Magnolia, Brunswick, Turkey, and other sorts grown in the Southern States, for the reason that fermentation and spoilage invariably occur during the long period required for drying; in fact, the difficulties commonly experienced in these States are so great that many consider drying practically impossible by any method known to the growers. The differences between the southern and the California-grown figs result primarily from differences in the climatic conditions under which they are produced and handled.

Drying with artificial heat.—For the reasons given, some type of drier employing heat is necessary even for moderately successful results in the drying of southern-grown figs. The following method, used in a somewhat limited experience in drying Celeste figs, has given good results:

The fruit for drying was selected rather carefully after being picked from the tree, all overripe soft fruits being culled out. The fully ripe but still firm fruits were dipped for one minute in a boiling lye solution made by dissolving 1 pound of concentrated lye in 10 gallons of water, then rinsed through several changes of water to remove adhering lye, spread upon the drying trays in a single, rather closely placed layer, and immediately put in the drier. The temperature was kept at 115° to 120° F. until the figs had lost moisture enough to become completely wilted and noticeably shriveled; then the temperature was gradually increased until it reached 145° at the completion of the process. The fruits were stirred from time to time during the drying, in order to prevent sticking to the trays, and those which dried the most rapidly were picked off as soon as they had attained the leathery, elastic character indicative of a properly dried fig. The drying occupied 20 to 30 hours at the temperatures specified.

A few persons who have had experience in drying figs follow the general method just outlined, but remove the figs from the trays when about half dried, immerse them in a boiling salt solution (1 pound of salt dissolved in a gallon of water) for three minutes, and return them to the trays for completing the drying. It is claimed that this treatment results in the production of a softer, more glossy product; it is also evident that such treatment sterilizes the surface and arrests any development of mold which might otherwise occur at the relatively low temperatures employed.

Oven and sun drying combined.—A combination of oven and sun drying has been successfully employed in treating small quantities of figs. Firm, well-ripened fruits are washed, drained, and spread in a single layer in ordinary baking pans. These are placed in the oven and the fire so regulated that the figs are heated through without becoming so hot as to cause bursting and the dripping of juice. After three or four hours in the oven the fruits are removed, cut in halves, and spread in a single layer, cut surfaces upward, on trays which are exposed to the sun. A strip of cheesecloth spread over the surface of the tray is necessary to protect the fruit from insects. If rainy weather sets in, or if any of the figs show indications of beginning to ferment, the drying of the fruit may be completed in the oven.

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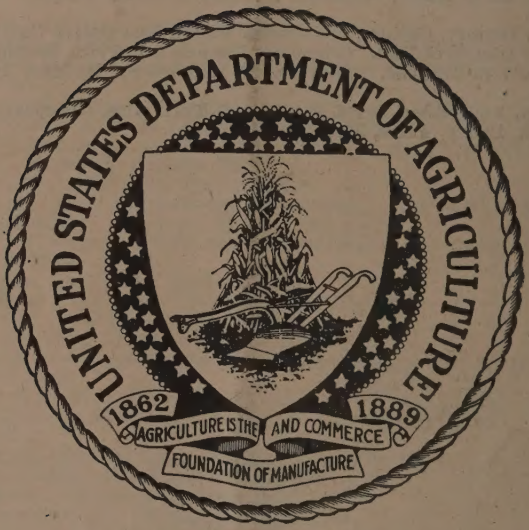

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